HYPRO®

Crop Spraying Pocket Guide 2012

www.hypro-eu.com

Hypro EU Limited was established in 1954 as Lurmark and has been manufacturing spray nozzles at its Cambridge site for more than 50 years. Hypro EU is the European business of the leading producer of spray pumps in North America. Hypro spray nozzles, pumps and sprayer components are fitted by the world's premier manufacturers of spray equipment. Hypro is part of the Water Division of Pentair Inc. Pentair employs 13,000 people worldwide in all areas of industrial and domestic fluid handling technology.

This booklet is designed as a quick reference guide to help you select nozzles that will achieve efficient and safe spray applications whatever the challenge.

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Working with Hypro Nozzles

CONVENTIONAL HYDRAULIC NOZZLES

For these nozzles, spray quality varies according to nozzle size (defined by nozzle flow in l/min) and with pressure, with larger sizes and lower pressures producing larger droplets.

The spray quality for each nozzle size and pressure is defined by the BCPC International Spray Classification System, which groups nozzles into five categories: VERY FINE, FINE, MEDIUM, COARSE AND VERY COARSE.

Spray quality classifications for Hypro nozzles are indicated in the tables on pages 13-24. Spray manufacturers usually indicate the optimum BCPC spray quality on product labels, but where spray quality is not indicated on a label, the principles shown in the table (right) should apply.

Fine sprays	Enhance spray retention on the target. Suitable for small targets and contact acting fungicides and insecticides. There is a higher risk of spray drift with fine sprays.
Medium sprays	The default option if no another spray quality is indicated.
Coarse sprays	Use with residual / soil applied herbicides where drift reduction is the priority.

INTERPRETING A BCPC NOZZLE CODE

Nozzle Type	Spray Angle	Nozzle Output	Rated Pressure
F (Flat fan) HC (Hollow cone) D (Deflector) FE (Evenspray)	Given in degrees (if known)	In litres per minute at rated pressure	Normally 3 bar, but 1 bar for deflector/anvil nozzles

For example: A Hypro 03F110 Flat Fan Spray Nozzle would have the BCPC code F110/1.2/3.

AIR INCLUSION NOZZLES

Traditionally Air-Inclusion nozzles have tended to be used in place of nozzles in the 'Coarse' or 'Very Coarse' BCPC classification and so had limited applications. However tests carried out by Silsoe and published in the latest HGCA Nozzle Selection Guide have shown that GuardianAIR™ nozzles produce finer droplets than other Air-Inclusion nozzles.

In practice this makes them more similar to a 'Medium' conventional spray quality and they have been successfully used for many spray applications in place of Flat Fan nozzles with the additional benefit of spray drift reduction. As a result they have already become the standard spring spraying nozzle for many farmers. However they are considered too coarse for very small targets, such as autumn spraying of black grass.

DRIFT CLASSIFICATION OF HYPRO AIR INCLUSION NOZZLES

Hypro Air-Inclusion Nozzles	Drift Reduction*	015	02	025	03	035	04	05	06	08
Guardian AIR™	> 75%	1.0 - 1.25	1.0 - 1.25	2.0 - 1.5	1.0 -1.5	1.0 - 1.5	1.0 - 1.5	1.0 - 1.5	-	-
Guardian AIR™ Twin	50%-75%	-	2.0 - 2.25	2.0 - 2.25	2.0 - 3.0	-	2.0 - 3.0[1]	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
DriftBETA	> 75%	2.0	2.0	2.0	2.0 - 3.0	-	2.0 - 3.0	2.0 - 6.0	2.0 - 6.0	-

* LERAP standard of drift reduction compared to FF110° blue 03 at 3 bar.
LERAP 2 Star classification for GuardianAIR™ Twin is provisional awaiting confirmation.

[1] GAT 04 achieves 25 - 50% drift reduction at these pressures.

NOZZLE CARE

1) CLEANING: Clear blocked nozzles by soaking in water and cleaning with a soft brush and air line. NEVER blow through orifice by mouth or poke with wire or pins, as this will damage the nozzles. At the end of spraying, nozzles should be removed, soaked, cleaned and refitted especially where a different chemical is going to be sprayed next time.

2) WEAR AND TEAR: Nozzles should be regularly checked for wear and damage. Keep one unused nozzle aside from each new set as a comparison. The whole set should be renewed when output has increased by 10% or more, or at least every year.

WHY NOZZLE CONDITION MATTERS

Faulty or worn nozzles are one of the main reasons that sprayers fail their tests under the UK National Sprayer Testing Scheme. In 2009-10 more than 2200 (16.3%) sprayers failed their tests for these reasons.

The table below shows the additional chemical costs of using worn nozzles with a 5% inaccuracy. In addition worn nozzles will cause uneven chemical distribution and consequent poorer spray efficacy.

Crop	Chemical cost / hectare*	Degree of innaccuracy	Cost / hectare**	Typical cost of new nozzles***	Area sprayed to recover cost of new nozzles
Winter wheat	£118.50	5%	£5.93	£95	14 Hectares
Winter barley	£85.50	5%	£4.28	£95	20 Hectares
Sugar beet	£130	5%	£6.50	£95	13 Hectares
Potatoes	£430	5%	£21.50	£95	4 Hectares
Winter oilseed rape	£96	5%	£4.80	£95	18 Hectares

*Source: 2007 Farm Management Pocket Book. **Represents cost of over application of just 5% ***Assumes 48 x Standard Flat Fan spray nozzles.

SPRAY VOLUME RATE

This is usually found on the agrochemical product label (in litres of water per hectare) with recommended upper and lower limits.

Select a rate based on:-

a) Special crop requirements and chemical mode of action; e.g. covering a dense canopy with a contact acting spray will require the higher end of the volume range.

b) The limits of sprayer pump capacity and the PTO speeds to be used. Note; always allow plenty of spare capacity for agitation - especially for wettable powders.

c) If in doubt use higher water volumes.

BOOM HEIGHT

Hypro flat fan nozzles are designed to overlap to the centre of each adjoining pattern.

To test the evenness of distribution:

- Choose an area of dry concrete
- Set boom height so that patterns overlap on the ground. (See guidelines below)
- Spray with clean water to wet the concrete
- If the concrete does not dry evenly, adjust boom height and repeat the test until drying is even

The boom height in the field should then be raised so that the pattern overlaps on the target (e.g. ground, weed or crop).

Nozzle Spacing (on spraybar)	Min. rec. boom height above target	
	80° tips	110° tips
50cm (20")	75cm (30")	50cm (20")
46cm (18")	53cm (21")	35cm (14")
33cm (13")	24cm (9")	40cm (16")

SPRAYER CALIBRATION

Sprayers should be calibrated using **plain** water only. Sprayers should be re-calibrated every 100 hectares (250 acres). Check and clean all filters and ensure the pump feed and delivery lines are free of restrictions prior to calibration.

1. Using a calibrated measuring cylinder, measure the output from a minimum of four nozzles (at least one from each boom section) whilst timing the operation - ensuring the pressure is set as required.
2. If the output of these nozzles differs slightly from required, adjust the pressure until the correct rate is achieved at each nozzle. Use the nozzle tables on pages 13-24 to ensure that a pressure change does not change the desired spray quality.
3. Should the output of these nozzles differ by a large amount which cannot be compensated by pressure then re-check calibration and calculations. If necessary, all nozzles should be replaced with a different size.

4. Any individual nozzle varying by more than 10% should be replaced - as should any nozzles showing broken or uneven spray patterns.

CAUTION:

The nozzle calibration charts are intended only as an approximate guide to performance. Variation can occur, particularly with liquids of varying viscosity and specific gravity.

Hypro offers equipment that allows you to check the pressure and spray output at the nozzle, for more details see page 31.

FILLING THE TANK:

Agitation reduces as the tank fills up with water. Always fill the tank by one third to avoid excessive agitation and foaming but avoid adding chemical to a full tank at which point agitation will be at its lowest.

Always rinse containers out as they are emptied. This means that rinsate ends up in the tank for spraying and contaminated containers are not left around whilst you are in the field. Hypro offer a selection of highly effective container cleaning nozzles (see page 30).

FORWARD SPEED

Before choosing your nozzle, decide on planned forward speed using the tables on pages 13-24 of this guide. With automatic rate controllers a change in speed results in a change in pressure which affects spray quality, so it is important to stick to the forward speed once a nozzle has been chosen. Usual spraying speeds are limited to around 16km/h, higher speeds increase work rate but they also increase boom bounce and turbulence that may result in unacceptable spray drift.

To calculate speed in km/h; divide 360 by the number of seconds it takes to travel 100 metres.

IDENTIFYING WIND SPEED

The BCPC advises that wind speeds of 3.2 to 6.5 km/h (2 - 4 mph) are ideal for spraying. The table below explains how to judge windspeed. If conditions deteriorate and spraying has to stop any spray that is left in the tank must be agitated and ideally regularly recirculated to prevent settling and blockages once spraying resumes.

Approximate air speed at boom height	Beaufort scale (at 10m*)	Description		Visible signs	Spraying
Less than 2 km/h (Less than 1.2 mph)	Force 0	Calm		Smoke rises vertically	Only use medium or coarse spray quality
2 - 3.2 km/h (1.2 - 2 mph)	Force 1	Light air		Direction shown by smoke drift	Acceptable spraying conditions
3.2 - 6.5 km/h (2 - 4 mph)	Force 2	Light Breeze		Leaves rustle, wind felt on face	Ideal spraying conditions
6.5 - 9.6 km/h (4 - 6 mph)	Force 3	Gentle Breeze		Leaves and twigs in constant motion	Increased risk of spray drift. Take special care
9.6 - 14.5 km/h (6 - 9 mph)	Force 4	Moderate		Small branches moved, raises dust or loose paper	Spraying inadvisable

* Wind speed at typical boom heights will be roughly half the speed at 10 metres above the ground.

Popular Nozzle Types

Hypro produces a huge array of nozzles for every conceivable application, the following popular nozzle types cover the majority of agricultural application requirements:

GuardianAIR™ 110° Finer Air-inclusion Nozzles (see p16)
Good spray coverage, with reduced drift, ideal for lower water rates. Suitable for a wide variety of applications to cereals, oilseed rape and other combinable crops.
At 1.25-1.5 bar - up to 75% drift reduction

Flat Fan DriftBETA 120° Nozzles (see p13)
Significant reduction in drift from coarse air-filled droplets. Suitable for soil-active and translocated foliar sprays. Avoid for selective grass weed herbicides and potato fungicides.

Flat Fan Lo-Drift® 110° Nozzles (see p14)
The original drift reducing nozzle. Spray is typically coarser than a conventional flat fan nozzle producing half the drift. Suitable for cereal fungicides and autumn residual herbicides.
for 06 at 2-3 bar

Hypro Flat Fan VP 110° Nozzles (see p15)
Excellent spray distribution over variable pressures of 1 to 5 bar. Ideal for use with automatic rate control systems for spraying a wide range of pesticides.

Hypro Flat Fan 110° & 80° Nozzles (see p17/18)
Versatile nozzle suitable for the overall application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum suitable for a wide range of targets.

Evenspray 80° Nozzles (see p19)
Non-tapering spray pattern designed specifically for band spray applications of pre and post emergent herbicides. Ideal for use with knapsack sprayers.

Cone Spray SwirlTip Disc and Core 80° - 90° Nozzles (see p20)
Finely atomised droplets in hollow cone pattern. Designed for band spraying of contact acting chemicals. Can also be used with air blast and mist sprayers at higher pressure.

Flood Spray PoliJet and Deflectip Anvil Nozzles (see p21)
Coarse spray, with very uniform distribution. Very resistant to clogging. Good for soil-acting herbicides. Ideal for use with knapsack sprayers.

Fastcap® ESI Liquid Fertiliser Nozzles (see p22)
One of the most compact liquid fetiliser nozzles on the market. A unique nozzle array and jet stabilising diffuser creates solid streams for excellent distribution and minimal crop scorch.

GuardianAIR™ Twin 110° Air-inclusion Nozzles (see p23)
A twin spray with 30° incline forward and backwards to help penetration and spray distribution in denser crop canopies. Based on the finer air-inclusion spray quality of the GuardianAIR™ nozzle and featuring an integral FastCap™.

Hypro XT Nozzles for Boomless Spraying (see p24)
For applications where it is not possible to use a conventional spray boom or to extend spraying width at the boom end. Throws a coarse, even spray flat fan pattern. Ideal for use in forests, amenity or pastureland.

Hypro TwinCap (see p25)
Accommodates two spray nozzles back-to-back in the same bayonet cap. Increase spray volume without coarsening spray quality. Ideal for potato blight fungicides and vegetable spraying.

Hypro Off Centre Nozzles (For details see www.hypro-eu.com)
Produce a similar spray pattern to standard 80° Flat Fan nozzles but with a foot-print that sprays off-centre to extend spray width. PART NUMBERS: 280C01 to 280C16.

Hypro FulcoTip (FCX) 80° Nozzles (For details see www.hypro-eu.com)
80° full cone pattern. Ideal for spot spraying with handheld sprayers.
PART NUMBERS: 30FCX02 to 30FCX08.

Hypro HollowTip (HCX) 80° Nozzles (For details see www.hypro-eu.com)
Designed to give an 80° hollow cone pattern for overall spraying. Finer spray quality.
PART NUMBERS: 30HCX2 to 30HCX18.

Misting Nozzles (For details see www.hypro-eu.com)
Designed to give extremely fine droplets suitable for humidification and evaporative cooling applications such as in grain storage, livestock areas and glasshouses.

All nozzles are designed to fit Hypro and most other standard caps. Threaded options are also available for most nozzle types.

Most agricultural nozzles are manufactured from polyacetal material, other materials are also available.

Nozzle Selection - Cereals and Oilseed Rape

Nozzle type	Air induction		Conventional			Conventional		Low drift (pre-orifice)	
Spray Pattern	Flat fan		Flat fan			Hollow cone		Flat fan	
Spray quality	'Finer'	'Coarser'	Fine	Medium	Coarse	Fine	Medium	Medium	Coarse
Likely drift potential	Low	Low	High	Med/low	Low	High	High	Low	Low
Nozzle example (Use Hypro nozzle tables to select the appropriate nozzle size and pressure)	 GuardianAIR™	 DriftBETA	 Hypro Flat fan & VP Flat fans			 Hollow cone / Disc & cone		 Hypro Lo-Drift	
Soil-acting herbicides									
Pre and early post emergence	✔	✔		✔	✔			✔	✔
Foliage-acting herbicides									
Small grasses (<3 leaves)[1]			✔✔	✔		✔	✔		
Grasses (>3 leaves)	✔		✔	✔✔				✔	
Broad leaved weeds (up to 2 cm across)			✔✔	✔✔					
Broad leaved weeds (2 - 5 cm across)	✔✔		✔	✔✔			✔		
Broad leaved weeds (>5 cm across)	✔✔✔			✔✔			✔	✔	
Large weeds: non-selective (e.g. glyphosate)	✔✔✔	✔		✔✔	✔			✔✔	✔
Cereal PGRs and eyespot fungicides									
Pre and post GS32	✔✔✔			✔✔				✔	
Cereal fungicides									
T0 - up to GS23	✔✔		✔	✔✔			✔	✔	
T1 and T2 - GS 24-49	✔✔✔	✔	✔	✔✔			✔	✔	
T3 - after GS50 (ear spray)	✔✔✔			✔✔			✔		
Cereal insecticides									
Autumn[1]	✔		✔	✔✔			✔		
Ear spray	✔✔		✔✔	✔		✔	✔		
Oilseed rape fungicides									
Vegetative phase	✔		✔	✔✔			✔	✔	
From green bud	✔✔✔		✔	✔✔			✔	✔	
Oilseed rape insecticides									
Vegetative stage			✔	✔✔			✔		
From green bud	✔✔✔		✔✔	✔		✔	✔		

[1] Inclining fan spray improves coverage of small grasses.

Always refer to the product label or latest application advice from the agrochemical manufacturer.

✔ Acceptable efficacy ✔✔ Preferred efficacy ✔✔✔ Best efficacy

Types of Hypro Sprayer Pumps

CENTRIFUGAL PUMPS

- Non-positive displacement pumps that rotate at high speed to create centrifugal force.
- Suitable for high volume application.
- Low maintenance requirement and simple operation.
- Self-priming options available.
- Suitable for high volume chemical application and liquid transfer.
- Ideal for self-propelled sprayers and high volume liquid fertilizer application.

ROLLER PUMPS

- Positive displacement pumps that use rotation to create uniform spray output.
- Self-priming.
- Easily maintained with few moving parts.
- Can be connected directly to PTO.
- Ideal for lower output small and medium sprayers used in all situations.
- Can also be used as an additional pump for high pressure rinsing or chemical dilution.

PISTON PUMPS

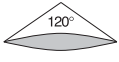
- Positive displacement pumps with relatively low flow and higher pressure.
- Self-priming.
- Can be connected directly to PTO.
- Ideal for stationary sprayers, misting and cooling systems.

Flat Fan DriftBETA 120° Nozzles

Significant reduction in drift from coarse air-filled droplets. For spraying in the widest weather window. Suitable for soil-active and translocated foliar sprays on larger targets (e.g. glyphosate, cereal fungicides). Avoid for selective grass weed herbicides and potato fungicides.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	LERAP RATING
Green	30DB015F120 (100 #)	2.0	0.490	73	59	49	42	37	33	☆☆☆
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
		6.0	0.849	127	102	85	73	64	57	
Yellow	30DB02F120 (100 #)	2.0	0.653	98	78	65	56	49	44	☆☆☆
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
		6.0	1.131	170	136	113	97	85	75	
Lilac	30DB025F120 (100 #)	2.0	0.816	122	98	82	70	61	54	☆☆☆
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
		6.0	1.414	212	170	141	121	106	94	
Blue	30DB03F120 (100 #)	2.0	0.980	147	118	98	84	73	65	☆☆☆
		3.0	1.200	180	144	120	103	90	80	☆☆☆
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.550	232	186	155	133	116	103	
		6.0	1.697	255	204	170	145	127	113	
Red	30DB04F120 (50 #)	2.0	1.306	196	157	131	112	98	87	☆☆☆
		3.0	1.600	240	192	160	137	120	107	☆☆☆
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
		6.0	2.263	339	272	226	194	170	151	
Brown	30DB05F120 (50 #)	2.0	1.633	245	196	163	140	122	109	☆☆☆
		3.0	2.000	300	240	200	171	150	133	☆☆☆
		4.0	2.309	346	277	231	198	173	154	☆☆☆
		5.0	2.582	387	310	258	221	194	172	☆☆☆
		6.0	2.828	424	339	283	242	212	189	☆☆☆
Grey	30DB06F120 (50 #)	2.0	1.960	294	235	196	168	147	131	☆☆☆
		3.0	2.400	360	288	240	206	180	160	☆☆☆
		4.0	2.771	416	333	277	238	208	185	☆☆☆
		5.0	3.098	465	372	310	266	232	207	☆☆☆
		6.0	3.394	509	407	339	291	255	226	☆☆☆

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacing.
ORDERING: Use part numbers shown.



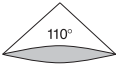
Flat Fan Lo-Drift® 110° Nozzles

The original drift reducing nozzle. Spray is typically coarser than a conventional flat fan nozzle producing half the drift. Trials show these work well with cereal fungicides and autumn residual herbicides.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	BCPC NOZZLE CODE
Green*	LD110-015 (100 #)	2.0	0.490	73	59	49	42	37	33	FRD110/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow*	LD110-02 (100 #)	2.0	0.653	98	78	65	56	49	44	FRD110/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac	LD110-025 (100 #)	2.0	0.816	122	98	82	70	61	54	FRD110/1./3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue*	LD110-03 (100 #)	2.0	0.980	147	118	98	84	73	65	FRD110/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red*	LD110-04 (50 #)	2.0	1.306	196	157	131	112	98	87	FRD110/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown*	LD110-04 (50 #)	2.0	1.633	245	196	163	140	122	109	FRD110/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey*	LD110-06 (50 #)	2.0	1.960	294	235	196	168	147	131	FRD110/2.4/3
		3.0	2.400	360	288	240	206	180	160	LERAP rating at 2-3 bar
		4.0	2.771	416	333	277	238	208	185	
White	LD110-08 (50 #)	2.0	2.613	392	314	261	224	196	174	FRD110/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	

*Also available as 80° nozzles

BCPC CODING MEDIUM COARSE



Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use part numbers shown.

Hypro Flat Fan VP 110° Nozzles

Excellent spray distribution over variable pressure of 1 to 5 bar. Ideal for use with automatic rate control systems for spraying a wide range of pesticides.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	BCPC NOZZLE CODE
Green*	VP110-015 (100 #)	1.0	0.346	52	42	35	30	26	23	F110/0.6/3
		2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
Yellow*	VP110-02 (100 #)	1.0	0.462	69	55	46	40	35	31	F110/0.8/3
		2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Lilac	VP110-025 (100 #)	1.0	0.577	87	69	58	49	43	38	F110/1.0/3
		2.0	0.816	122	98	82	70	61	54	
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
Blue*	VP110-03 (100 #)	1.0	0.693	104	83	69	59	52	46	F110/1.2/3
		2.0	0.980	147	118	98	84	73	65	
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.549	232	186	155	133	116	103	
Brown Red	VP110-035 (100 #)	1.0	0.808	121	97	81	69	61	54	F110/1.4/3
		2.0	1.143	171	137	114	98	86	76	
		3.0	1.400	210	168	140	120	105	93	
		4.0	1.616	242	194	162	139	121	108	
		5.0	1.807	271	217	181	155	136	120	
Red*	VP110-04 (50 #)	1.0	0.924	139	111	92	79	69	62	F110/1.6/3
		2.0	1.306	196	157	131	112	98	87	
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown*	VP110-05 (50 #)	1.0	1.155	173	139	115	99	87	77	F110/2.0/3
		2.0	1.633	245	196	163	140	122	109	
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
Grey*	VP110-06 (50 #)	1.0	1.386	208	166	139	119	104	92	F110/2.4/3
		2.0	1.960	294	235	196	168	147	131	
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	

*Also available as 80° nozzles.

BCPC CODING FINE MEDIUM COARSE

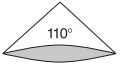
Additional sizes are also available - these are VP08, VP10, VP15.
Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use part numbers shown.

GuardianAIR™ 110° Finer Air-Inclusion Nozzles

Drift reducing nozzle with slight rear incline to compensate for forward motion. More droplets and better coverage than other Air-Inclusion nozzles. Ideal for lower water rates. Suitable for a wide variety of applications to cereals, oilseed rape and other combinable crops. Holds spray pattern well at lower pressures.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	LERAP RATING
Green	GA110-015AZ (100 #)	1.0	0.346	52	42	35	30	26	23	☆☆☆ 1-1.25 bar
		2.0	0.490	73	59	49	42	37	33	
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
		5.0	0.775	116	93	77	66	58	52	
Yellow	GA110-02AZ (100 #)	1.0	0.462	69	55	46	40	35	31	☆☆☆ 1-1.25 bar
		2.0	0.653	98	78	65	56	49	44	
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
Lilac	GA110-025AZ (100 #)	1.0	0.577	87	69	58	49	43	38	☆☆☆ 1-1.5 bar
		2.0	0.816	122	98	82	70	61	54	
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
Blue	GA110-03AZ (100 #)	1.0	0.693	104	83	69	59	52	46	☆☆☆ 1-1.5 bar
		2.0	0.980	147	118	98	84	73	65	
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.549	232	186	155	133	116	103	
Brown Red	GA110-035AZ (100 #)	1.0	0.808	121	97	81	69	61	54	☆☆☆ 1-1.5 bar
		2.0	1.143	171	137	114	98	86	76	
		3.0	1.400	210	168	140	120	105	93	
		4.0	1.616	242	194	162	139	121	108	
		5.0	1.807	271	217	181	155	136	120	
Red	GA110-04AZ (50 #)	1.0	0.924	139	111	92	79	69	62	☆☆☆ 1-1.5 bar
		2.0	1.306	196	157	131	112	98	87	
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
Brown	GA110-05AZ (50 #)	1.0	1.155	173	139	115	99	87	77	☆☆☆ 1-1.5 bar
		2.0	1.633	245	196	163	140	122	109	
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	

Spray quality is similar across different nozzle sizes when used at the same pressure.



Up to 75% drift reduction.

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use codes shown, also available as bags of 50 with a usage card (order by adding _ bag 50 to code).

Hypro Flat Fan 110° Nozzles

Versatile nozzle suitable for the overall application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum allowing delivery of effective dose to a wide range of targets.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	BCPC NOZZLE CODE
Orange	F110-01 (100 #)	2.0	0.327	49	39	33	28	24	22	F110/0.4/3
		3.0	0.400	60	48	40	34	30	27	
		4.0	0.462	69	55	46	40	35	31	
Green	F110-015 (100 #)	2.0	0.490	73	59	49	42	37	33	F110/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow	F110-02 (100 #)	2.0	0.653	98	78	65	56	49	44	F110/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac	F110-025 (100 #)	2.0	0.816	122	98	82	70	61	54	F110/1.0/3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue	F110-03 (100 #)	2.0	0.980	147	118	98	84	73	65	F110/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red	F110-04 (50 #)	2.0	1.306	196	157	131	112	98	87	F110/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown	F110-05 (50 #)	2.0	1.633	245	196	163	140	122	109	F110/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey	F110-06 (50 #)	2.0	1.960	294	235	196	168	147	131	F110/2.4/3
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
White	F110-08 (50 #)	2.0	2.613	392	314	261	224	196	174	F110/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
Light Blue	F110-10 (30 #)	2.0	3.266	490	392	327	280	245	218	F110/4.0/3
		3.0	4.000	600	480	400	343	300	267	
		4.0	4.619	693	554	462	396	346	308	
Light Green	F110-15 (30 #)	2.0	4.899	735	588	490	420	367	327	F110/6.0/3
		3.0	6.000	900	720	600	514	450	400	
		4.0	6.928	1039	831	693	594	520	462	
Black	F110-20 (30 #)	2.0	6.532	980	784	653	560	490	435	F110/8.0/3
		3.0	8.000	1200	960	800	686	600	533	
		4.0	9.238	1386	1109	924	792	693	616	

BCPC CODING FINE MEDIUM COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.
ORDERING: Use part numbers shown.

Hypro Flat Fan 80° Nozzles

Versatile nozzle suitable for the overall application of herbicides, fungicides, insecticides and growth regulators. Mixed droplet spectrum allowing delivery of effective dose to a wide range of targets.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	LITRES/HECTARE AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	BCPC NOZZLE CODE
Orange	F80-01 (100 #)	2.0	0.327	49	39	33	28	24	22	F80/0.4/3
		3.0	0.400	60	48	40	34	30	27	
		4.0	0.462	69	55	46	40	35	31	
Green	F80-015 (100 #)	2.0	0.490	73	59	49	42	37	33	F80/0.6/3
		3.0	0.600	90	72	60	51	45	40	
		4.0	0.693	104	83	69	59	52	46	
Yellow	F80-02 (100 #)	2.0	0.653	98	78	65	56	49	44	F80/0.8/3
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
Lilac	F80-025 (100 #)	2.0	0.816	122	98	82	70	61	54	F80/1.0/3
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
Blue	F80-03 (100 #)	2.0	0.980	147	118	98	84	73	65	F80/1.2/3
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
Red	F80-04 (50 #)	2.0	1.306	196	157	131	112	98	87	F80/1.6/3
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
Brown	F80-05 (50 #)	2.0	1.633	245	196	163	140	122	109	F80/2.0/3
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
Grey	F80-06 (50 #)	2.0	1.960	294	235	196	168	147	131	F80/2.4/3
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
White	F80-08 (50 #)	2.0	2.613	392	314	261	224	196	174	F80/3.2/3
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
Light Blue	F80-10 (30 #)	2.0	3.266	490	392	327	280	245	218	F80/4.0/3
		3.0	4.000	600	480	400	343	300	267	
		4.0	4.619	693	554	462	396	346	308	
Light Green	F80-15 (30 #)	2.0	4.899	735	588	490	420	367	327	F80/6.0/3
		3.0	6.000	900	720	600	514	450	400	
		4.0	6.928	1039	831	693	594	520	462	
Black	F80-20 (30 #)	2.0	6.532	980	784	653	560	490	435	F80/8.0/3
		3.0	8.000	1200	960	800	686	600	533	
		4.0	9.238	1386	1109	924	792	693	616	

BCPC CODING FINE MEDIUM COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings which gives overlap when boom set at 75 cm.

ORDERING: Use part numbers shown.

Hypro EvenSpray 80° Nozzles

Designed specifically for band spray applications of pre and post emergent herbicides.
Also ideal for use with knapsack sprayers.

	PART NUMBER. (REC. FILTER MESH)	PRESS. BAR	FLOW L/MIN	BCPC NOZZLE CODE
Orange	E80-01 (100 #)	2.0 3.0 4.0	0.327 0.400 0.462	FE80/0.4/3
Green	E80-015 (100 #)	2.0 3.0 4.0	0.490 0.600 0.693	FE80/0.6/3
Yellow	E80-02 (80 #)	2.0 3.0 4.0	0.653 0.800 0.924	FE80/0.8/3
Blue	E80-03 (80 #)	2.0 3.0 4.0	0.980 1.200 1.386	FE80/1.2/3
Red	E80-04 (50 #)	2.0 3.0 4.0	1.306 1.600 1.848	FE80/1.6/3
Brown	E80-05 (50 #)	2.0 3.0 4.0	1.633 2.000 2.309	FE80/2.0/3
Grey	E80-06 (50 #)	2.0 3.0 4.0	1.960 2.400 2.771	FE80/2.4/3
White	E80-08 (50 #)	2.0 3.0 4.0	2.613 3.200 3.695	FE80/3.2/3

Application rates on this chart are based upon tests at 3 bar pressure.
ORDERING: Use part numbers as shown.

BCPC CODING FINE MEDIUM COARSE

SELECTING THE CORRECT NOZZLE FOR BAND SPRAYING

Using the chemical manufacturer's recommended rate (L/ha) use the following formulae to calculate the flow rate required per nozzle.

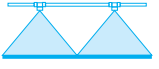
$$\text{L/min per nozzle} = \frac{\text{l/ha x km/hr x band width (m)}}{600}$$

Ensure that the chosen nozzle provides the spray quality recommended on the manufacturer's chemical label.

Cone Spray SwirlTip Disc and Core 80° - 90° Nozzles

Finely atomised droplets in hollow cone pattern. Designed for band spraying of contact acting chemicals. Can also be used with air blast and mist sprayers at higher pressures.

DISC	CORE	PART NUMBERS (SPRAY ANGLE)	PRESSURE BAR	FLOW LPM	APPLICATION RATES L/HA AT KM/H 8KPH	10KPH	12KPH	BCPC NOZZLE CODE
		DC04/CR13 (80°)	3 4 5	0.47 0.54 0.61	56 65 73	47 54 61	35 41 46	HC/0.47/3
		DC04/CR23 (80°)	3 4 5	0.59 0.68 0.76	71 82 91	59 68 76	44 51 57	HC/0.59/3
		DC05/CR23 (90°)	3 4 5	0.71 0.82 0.92	85 98 110	71 82 92	53 62 69	HC/0.71/3
		DC06/CR23 (90°)	3 4 5	0.83 0.96 1.07	100 115 129	83 96 107	62 72 80	HC/0.83/3
		DC05/CR25 (80°)	3 4 5	1.38 1.59 1.78	166 191 214	138 159 178	104 119 134	HC/1.38/3
		DC06/CR25 (85°)	3 4 5	1.74 2.00 2.24	209 240 269	174 200 224	131 150 168	HC/1.74/3
		DC07/CR25 (90°)	3 4 5	2.05 2.37 2.65	246 284 318	205 237 265	154 178 199	HC/2.05/3
		DC06/CR45 (95°)	3 4 5	2.29 2.64 2.96	275 317 355	229 264 296	172 198 222	HC/2.29/3
		DC08/CR25 (80°)	3 4 5	2.41 2.78 3.11	289 334 373	241 278 311	181 209 233	HC/2.41/3
		DC07/CR45 (85°)	3 4 5	2.68 3.10 3.46	322 371 415	268 310 346	201 232 260	HC/2.68/3
		DC08/CR45 (90°)	3 4 5	3.32 3.83 4.29	398 460 514	332 383 429	249 287 321	HC/3.32/3



BCPC CODING FINE MEDIUM COARSE

Application rates shown on this chart are based upon tests at 3 bar and 50cm nozzle spacings.

ORDERING: Both disc and core are required. Use disc and core number prefixed by 30: e.g. 30-DC-04/30-CR-13.

Flood Spray PoliJet and DeflecTip Anvil Nozzles

Coarse spray, with very uniform distribution. Very resistant to clogging. Good for soil-acting herbicides. The AN (Polijet) range is designed for use with knapsack sprayers giving good overall coverage and the choice of 4 different spray widths.

	PART NUMBER (REC. FILTER MESH)	SPRAY ANGLE	PRESSURE BAR	FLOW LPM	SPRAY WIDTH (50 cm HEIGHT)	APPLICATION RATES L/HA AT KM/H 2KPH	3KPH	4KPH	5KPH	BCPC NOZZLE CODE
Orange	DT0.5 (100#)	80°	1.0	0.23		81	54	41	33	D/0.23/1
			2.0	0.33	0.8m	115	77	58	46	
			3.0	0.40		141	94	71	56	
Green	DT0.75 (100#)	95°	1.0	0.35		94	63	47	38	D/0.35/1
			2.0	0.49	1.1m	133	89	66	53	
			3.0	0.59		163	109	81	65	
Yellow	DT1.0 (100#)	105°	1.0	0.46		105	70	52	42	D/0.46/1
			2.0	0.65	1.3m	148	99	74	59	
			3.0	0.80		182	121	91	73	
Blue	DT1.5 (50#)	105°	1.0	0.68		157	105	79	63	D/0.68/1
			2.0	0.97	1.3m	223	148	111	89	
			3.00	1.17		273	182	136	109	
Red	DT2.0 (50#)	105°	1.0	0.91		210	140	105	84	D/0.91/1
			2.0	1.29	1.3m	297	198	148	119	
			3.0	1.58		364	242	182	145	
Brown	DT2.5 (50#)	110°	1.0	1.14		239	160	120	96	D/1.14/1
			2.0	1.61	1.4m	339	226	169	135	
			3.0	1.98		415	276	207	166	
Grey	DT3.0 (50#)	110°	1.0	1.37		287	192	144	115	D/1.37/1
			2.0	1.93	1.4m	406	271	203	163	
			3.0	2.37		498	332	249	199	
Yellow	AN0.6 (100#)	55°	1.0	0.60		360	240	180	144	D/0.6/1
			2.0	0.85	0.5m	510	340	255	204	
			3.0	1.04		624	416	312	250	
Green	AN1.2 (50#)	90°	1.0	1.20		360	240	180	144	D/1.2/1
			2.0	1.70	1.0m	510	340	255	204	
			3.0	2.08		624	416	312	250	
Blue	AN1.8 (50#)	110°	1.0	1.80		360	240	180	144	D/1.8/1
			2.0	2.55	1.5m	510	340	255	204	
			3.0	3.12		624	416	312	250	
Red	AN2.4 (50#)	130°	1.0	2.40		360	240	180	144	D/2.4/1
			2.0	3.39	2.0m	510	340	255	204	
			3.0	4.16		624	416	312	250	

BCPC CODING FINE MEDIUM COARSE

Application rates given refer to single nozzle application at 50 cm above target. Swath widths are given at 1 bar pressure.
ORDERING: Use part number prefixed by 30: e.g. 30AN1.8
Additional DeflecTip nozzle sizes are available: DT4.0, DT5.0, DT7.5, DT10, DT15 & DT20, see www.hypro-eu.com for nozzle tables.

Fastcap® ESI Liquid Fertiliser Nozzles

Hypro's liquid fertiliser dribble cap is one of the most compact on the market. A unique nozzle array and jet stabilising diffuser creates solid streams for excellent distribution and minimal crop scorch.

Available in sizes 015 to 06 and 20 with plastic metering discs, and sizes 08, 10 and 15 with ceramic metering discs.

	PART NUMBER.	PRESS. BAR	FLOW L/MIN	APPLICATION RATES L/HA AT KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH
Green	FC-HESI-110015P (6 pack)	1.0	0.346	52	42	35	30	26	23
		2.0	0.490	73	59	49	42	37	33
		3.0	0.600	90	72	60	51	45	40
		4.0	0.693	104	83	69	59	52	46
Yellow	FC-HESI-11002P (6 pack)	1.0	0.462	69	55	46	40	35	31
		2.0	0.653	98	78	65	56	49	44
		3.0	0.800	120	96	80	69	60	53
		4.0	0.924	139	111	92	79	69	62
Blue	FC-HESI-11003P (6 pack)	1.0	0.693	104	83	69	59	52	46
		2.0	0.980	147	118	98	84	73	65
		3.0	1.200	180	144	120	103	90	80
		4.0	1.386	208	166	139	119	104	92
Red	FC-HESI-11004P (6 pack)	1.0	0.924	139	111	92	79	69	62
		2.0	1.306	196	157	131	112	98	87
		3.0	1.600	240	192	160	137	120	107
		4.0	1.848	277	222	185	158	139	123
Brown	FC-HESI-11005P (6 pack)	1.0	1.155	173	139	115	99	87	77
		2.0	1.633	245	196	163	140	122	109
		3.0	2.000	300	240	200	171	150	133
		4.0	2.309	346	277	231	198	173	154
Grey	FC-HESI-11006P (6 pack)	1.0	1.386	208	166	139	119	104	92
		2.0	1.960	294	235	196	168	147	131
		3.0	2.400	360	288	240	206	180	160
		4.0	2.771	416	333	277	238	208	185
White	FC-HESI-11008 (6 pack)	1.0	1.848	277	222	185	158	139	123
		2.0	2.613	392	314	261	224	196	174
		3.0	3.200	480	384	320	274	240	213
		4.0	3.695	554	443	370	317	277	246
Light Blue	FC-HESI-11010 (6 pack)	1.0	2.309	346	277	231	198	173	154
		2.0	3.266	490	392	327	280	245	218
		3.0	4.000	600	480	400	243	300	267
		4.0	4.619	693	554	462	396	346	308
Light Green	FC-HESI-11015 (6 pack)	1.0	3.464	520	416	346	297	260	231
		2.0	4.899	735	588	490	420	367	327
		3.0	6.000	900	720	600	514	450	400
		4.0	6.928	1039	831	693	594	520	462
Black	FC-HESI-11020P (6 pack)	1.0	0.462	690	550	460	400	350	310
		2.0	0.653	980	784	653	560	490	435
		3.0	0.800	1200	960	800	686	600	533
		4.0	0.924	1386	1109	924	792	693	616

NB: Application rates shown in this chart are based upon tests at 3 bar, 50cm nozzle spacing and 50cm boom height. Flow rates are based on water and allowance must be made for liquids with different viscosity and specific gravity. For calculation see page 48. ORDERING: Use codes shown

GuardianAIR™ Twin 110° Air-inclusion Nozzles

A twin spray with 30° incline forward and backward to help penetration and spray distribution in denser crop canopies. Based on the finer air-inclusion spray quality of the GuardianAIR™ nozzle and featuring an integral FastCap™.

	PART NUMBER (REC. FILTER MESH)	PRESS. BAR	FLOW (L/MIN)	LITRES/HECTARE @ KM/H 8KPH	10KPH	12KPH	14KPH	16KPH	18KPH	LERAP* RATING
Yellow	GAT110-02_PK10 (100 #)	2.0	0.653	98	78	65	56	49	44	☆☆☆ 2.0-2.25 bar
		3.0	0.800	120	96	80	69	60	53	
		4.0	0.924	139	111	92	79	69	62	
		5.0	1.033	155	124	103	89	77	69	
		6.0	1.131	170	136	113	97	85	75	
Lilac	GAT110-025_PK10 (100 #)	2.0	0.816	122	98	82	70	61	54	☆☆☆ 2.0-2.25 bar
		3.0	1.000	150	120	100	86	75	67	
		4.0	1.155	173	139	115	99	87	77	
		5.0	1.291	194	155	129	111	97	86	
		6.0	1.414	212	170	141	121	106	94	
Blue	GAT110-03_PK10 (100 #)	2.0	0.980	147	118	98	84	73	65	☆☆☆ ☆☆☆ 2.0-3.0 bar
		3.0	1.200	180	144	120	103	90	80	
		4.0	1.386	208	166	139	119	104	92	
		5.0	1.549	232	186	155	133	116	103	
		6.0	1.697	255	204	170	145	127	113	
Red	GAT110-04_PK10 (50 #)	2.0	1.306	196	157	131	112	98	87	☆ ☆ 2.0-3.0 bar
		3.0	1.600	240	192	160	137	120	107	
		4.0	1.848	277	222	185	158	139	123	
		5.0	2.066	310	248	207	177	155	138	
		6.0	2.263	339	272	226	194	170	151	
Brown	GAT110-05_PK10 (50 #)	2.0	1.633	245	196	163	140	122	109	☆☆ ☆☆ 2.0-3.0 bar
		3.0	2.000	300	240	200	171	150	133	
		4.0	2.309	346	277	231	198	173	154	
		5.0	2.582	387	310	258	221	194	172	
		6.0	2.828	424	339	283	242	212	189	
Grey	GAT110-06_PK10 (50 #)	2.0	1.960	294	235	196	168	147	131	☆☆ ☆☆ 2.0-3.0 bar
		3.0	2.400	360	288	240	206	180	160	
		4.0	2.771	416	333	277	238	208	185	
		5.0	3.098	465	372	310	266	232	207	
		6.0	3.394	509	407	339	291	255	226	
White	GAT110-08_PK10 (50 #)	2.0	2.613	392	314	261	224	196	174	☆☆ ☆☆ 2.0-3.0 bar
		3.0	3.200	480	384	320	274	240	213	
		4.0	3.695	554	443	370	317	277	246	
		5.0	4.131	620	496	413	354	310	275	
		6.0	4.525	679	543	453	388	339	302	

*LERAP classification for GuardianAIR™ Twin is provisional awaiting confirmation.

Spray quality is consistent across different nozzle sizes when used at the same pressure.
Application rates shown in this chart are based on tests at 3 bar and 50 cm nozzle spacing.

ORDERING: GuardianAIR™ Twin are sold in packs of 10. To order use codes shown.
GuardianAIR™ Twin spares: Seal 65-BS205, Cage 30Q3579A, A filter can be used in place of the cage, see page 28.

Hypro XT Nozzles for Boomless Spraying

For applications where it is not possible to use a conventional spray boom or to extend spraying width at the boom end. Throws a coarse, even spray flat fan pattern up to 4.9 metres. Ideal for use in forests or pastureland where there are obstructions to spraying. Available with threaded stainless steel body or with integral FastCap® bayonet attachment (FC option for sizes 010 to 043).

				APPLICATION RATES L/HA AT KM/H										SWATH WIDTH (M) @ 3BAR	XT THREAD
	PART NUMBER	BAR	L/MIN	4	5	6	7	8	10	12	14	16	18	20	
Green	XT010 & FC-XT010	2	3.2	124	99	83	71	62	50	41	35	31	28	25	3.9	¼"
		3	3.9	152	121	101	87	76	61	51	43	38	34	30		
		4	4.6	175	140	117	100	88	70	58	50	44	39	35		
Blue	XT020 & FC-XT020	2	6.4	201	161	134	115	101	81	67	58	50	45	40	4.8	¼"
		3	7.9	247	197	165	141	123	99	82	71	62	55	49		
		4	9.1	265	228	190	163	142	114	95	81	71	63	57		
Yellow	XT024 & FC-XT024	2	7.7	237	189	158	135	118	95	79	68	59	53	47	4.9	¼"
		3	9.5	290	232	193	166	145	116	97	83	73	64	58		
		4	10.9	335	268	223	191	167	134	112	96	84	74	67		
Orange	XT043 & FC-XT043	2	13.9	473	378	315	270	236	189	158	135	118	105	95	4.4	⅜"
		3	17.0	579	463	386	331	289	232	193	165	145	129	116		
		4	19.6	668	535	446	382	334	267	223	191	167	149	134		
Red	XT080	2	25.8	992	793	661	567	496	397	331	283	248	220	198	3.9	½"
		3	31.6	1215	972	810	694	607	486	405	347	304	270	243		
		4	36.5	1403	1122	935	802	701	561	468	401	351	312	281		
White	XT167	2	53.8	1878	1502	1252	1073	939	751	626	537	469	417	376	4.3	¾"
		3	65.9	2300	1840	1533	1314	1150	920	767	657	575	511	460		
		4	76.1	2656	2125	1771	1518	1328	1062	885	759	664	590	531		
Grey	XT215	2	69.3	2122	1697	1414	1212	1061	849	707	606	530	471	424	4.9	¾"
		3	84.9	2598	2079	1732	1485	1299	1039	866	742	650	577	520		
		4	98.0	3000	2400	2000	1715	1500	1200	1000	857	750	667	600		

Application rates are based on the swath widths listed at 3 bar pressure and boom Height 1.2m. Use the following calculation if using a different swath.

$$L/ha = \frac{L/min \times 600}{KM/H \times swath\ width}$$

Ordering - Use codes shown. (FC = Fastcap Option). Holder available, part no. I5Q3570A. Giokit containing pattern generator, flow insert and internal o-ring for stainless steel nozzle is available, to order a Giokit use part number followed by 'G' e.g. XT010G.

Flow rates are based on water, allowance must be made for liquids of different viscosity and specific gravity, (e.g. liquid fertiliser).
For calculation see page 48.

BAYONET CAPS

Hypro caps feature a simple twisting operation for easy installation and removal and automatic alignment of nozzles. Suitable for use with Hypro, Arag, Teejet, Berthoud and Geoline manufactured nozzle bodies. All caps also require a seal, part number 22W11MF64.

	FLAT FAN; DB, GA, LD, VP, F	CONE; FCX, HCX, Disc & Core
Orange	15OR2606	15OR2604
Green	15RG2606	15RG2604
Yellow	15YE2606	15YE2604
Lilac	15LL2606	15LL2604
Blue	15UB2606	15UB2604
Brown Red	15RB2606	-
Red	15RE2606	15RE2604
Brown	15LB2606	15LB2604
Grey	15GY2606	15GR2604
White	15WH2606	15WH2604
Light Blue	15CB2606	15CB2604
Light Green	15LG2606	15LG2604
Black	15BL2606	15BL2604

Cap for Albuz Standard nozzle: 15BL2603 (Black only).

TWINCAP

Cap holds two nozzles. The spray is inclined at 30 degrees from the vertical forward and backward which is ideal for good spray penetration and small upright targets. Can be used to apply a finer spray than a single larger size nozzle. Ideal for potato blight sprays and higher water volumes in vegetable crops.
Part numbers: 152607TC (Acetal) 15Q2530TC (PDVF acid resistant).
Where a single inclined jet only is required a blank nozzle can also be fitted to one position (part no. 30KBLANK).

HARDI CAP ADAPTOR

Alows Hypro bayonet caps to be fitted to Hardi sprayers. A different adaptor is needed to fit Jacto and Agrifac manufactured nozzle bodies..

PART NUMBER (pack of 10)
9950-0024

ProFlo™ Nozzle Holders

A choice of turret styles that can accommodate from 1 to 5 different nozzles on a holder. Multi-holders mean that nozzles can be changed over easily to quickly adapt to different spraying requirements, maintaining maximum flexibility.

All holders are fitted with chemical saving diaphragm check valves (EPDM or Viton© seals) or a Prostop™ pneumatic DCV. Offered with ½, ¾, 1 inch, 20 or 25mm clamp sizes to fit common pipe sizes.

PROFLO 3 WAY NOZZLE BODY

Diaphragm Options	Part Number – Diameter of Pipe				
	½"	¾"	1"	20mm	25mm
EPDM (RED)	4223N-B322	4223N-B323	4223N-B324	4223N-B327	4223N-B328
VITON© (GREEN)	4223N-B322V	4223N-B323V	4223N-B324V	4223N-B327V	4223N-B3228V

PROFLO 3 WAY NOZZLE BODY (UDDER STYLE)

Diaphragm Options	Part Number – Diameter of Pipe		
	½"	¾"	1"
EPDM (RED)	4222N-B322	4222N-B323	4222N-B324

PROFLO 5 WAY NOZZLE BODY

Diaphragm Options	Part Number – Diameter of Pipe				
	½″	¾″	1″	20mm	25mm
EPDM (RED)	4223N-B522	4223N-B523	4223N-B524	4223N-B527	4223N-B528
VITON© (GREEN)	4223N-B522V	4223N-B523V	4223N-B524V	4223N-B527V	4223N-B5228V

PROFLO SINGLE NOZZLE BODY

Diaphragm Options	Part Number – Diameter of Pipe				
	½″	¾″	1″	20mm	25mm
EPDM (RED)	4221N-B122	4221N-B123	4221N-B124	4221N-B127	4221N-B128
VITON© (GREEN)	4221N-B122V	4221N-B123V	4221N-B124V	4221N-B127V	4221N-B128V

PROSTOP™ AIR-ACTUATED NOZZLE CONTROL VALVE

Utilises compressed air to open and allow flow to the nozzle and spring to close. All ProFlo™ nozzle holders can be ordered pre-fitted with ProStop™ in place of a DCV. To order, add 'PS' to ProFlo™ nozzle body part numbers shown.

PART NUMBER
PS3/4F-PN

Nozzle Filters

Precision-made in durable polypropylene or stainless steel mesh. Made in ISO 19732-2007 standard colours.
For filter size recommendations please see table on page 43.

POLYPROPYLENE UNIVERSAL FILTER

Part Number	Colour	Mesh
TS01-50	Blue	50
TS01-100	Green	100

POLYPROPYLENE GUARDIAN AIR™ TWIN FILTER

Part Number	Colour	Mesh
TS02-50	Blue	50
TS02-100	Green	100

STAINLESS STEEL MESH BALL-CHECK FILTER

Part Number	Colour	Mesh
32100550	Blue	50
32100510	Green	100

Durable tank lids made of polypropylene that are resistant to chemical attack and weathering. Hinged options with hasp that allows locking. Available with Duralok® technology to achieve an interlocking lid closure. Contact us for tanks lids other than those shown here.

HINGED LID WITH 180 ° OPENING LOCKING HASP AND DURALOK® CLOSURE

Type	Diameter	
	12" (305mm)	16" (406mm)
LABYRINTH	TL12-0006	TL16-0006
BULLET	TL12-0007	TL16--0007

TANK LID WITH RING AND DURALOK® CLOSURE

Type	Diameter		
	8" (203mm)	12" (305mm)	16" (406mm)
NONE	TL08-0001	TL12-0001	TL16-0001
LABYRINTH	TL08-0002	TL12-0002	TL16-0002
BULLET	TL08-0003	TL12-0003	TL16-0003

GASKET FOR TANK LIDS

Diameter	Part Number
8" (203mm)	TLP-0007
12" (305mm)	TLP-0018
16" (406mm)	TLP-0023

Nozzles for Cleaning Tanks and Containers

PROCLEAN™ ROTATING NOZZLES
For faster 360 degree agrochemical container cleaning.

PART NO: PC1/2F-36075

PROCLEAN™ TANK WASH NOZZLE
Rotating tank wash nozzle designed to be mounted downwards. Directs spray to top and sides of tank:

PART NO: PC1/2F-235120

PROCLEAN™ PLUS NOZZLE
A powerful single jet designed to clean the sediment at the base of containers. Ideally used in conjunction with ProClean.

PART NO: 30B4SNF70E35

STATIC TANK WASH NOZZLE:

PART NO: 01TWQ2424

PROCLEAN™ ON/OFF VALVE
Allows flow to the nozzle when depressed.

PART NO: PV1/2F1/2M-MA

JET AGITATORS
Ensure good mixing and suspension of chemicals with induction ratios of up to 5 to 1:

PART NO: A1A5HE3371

BALL VALVES

A range of robust and reliable 2, 3, 4 and 5 way ball valves that ensure spray liquid flows smoothly for minimal pressure losses.

- Constructed from glass reinforced polypropylene
- Electric and manual options
- Choice of bottom or side connection
- Unique mounting systems

Hypro also offer a selection of butterfly, solenoid, pressure regulating and high flow pneumatic valves

CONTROL UNITS

A range of modular control units incorporating a choice of volumetric regulating valves, adjustable pressure relief valves, flowmeters and line filters, with choice of inlet and bypass diameters. Control panels are also available to suit a wide variety of boom section combinations.

FLOWMETERS

Orion electromagnetic flow meters measure the volume flow of electrically conductive liquids using a magnetic field. With no mechanical moving parts, these units are an accurate, robust and reliable way to determine flow. Results can be displayed on the unit itself or output to a monitor/computer. Accurate to 0.5% within flow range, performance is not affected by fluid density or viscosity.

Filters and Row Markers

FOOT FILTERS

Provide the first or preliminary stage of filtration.
The coarse mesh prevents very large particles or debris from being drawn into the liquid storage tank.
1", 1 1/4", 1 1/2" and 2". 20 mesh filter element.

SUCTION FILTERS

Provide second stage filtration, removing larger particles.
They offer protection for the pump and spray componentry.
Available with 1 1/4", 1 1/2", 2" & 3" male parts.
Filtration levels available; 30 & 50 mesh

PRESSURE LINE FILTERS

Provide third stage filtration. Positioned between pump and spray lines they remove fine particles, preventing nozzle blockage or excessive wear.
Available with 1/2", 3/4", 1", 1 1/4" & 1 1/2" female ports. Filtration levels available; 30, 50, 80 & 250 mesh.

ROW MARKERS

A bolt-on system includes blobber unit, compressor and all necessary pipework to suit a 24m sprayer.
PART NO: 52520005

To ensure that you obtain the best performance from your sprayer, Hypro supplies a range of specially developed equipment.

MASTER PRESSURE GAUGE 0-10 BAR

Accurate to ± 1% for comparative testing of boom pressure gauges in conjunction with multi-port adaptor.
PART NO: 366010100

MULTI-PORT PRESSURE GAUGE TESTING ADAPTOR

Designed to test the accuracy of your pressure gauge. Multi-ported to accommodate different gauge types.
PART NO: 360Q3166

REDBALL INSTANT CALIBRATOR

Gives an instant, accurate flow rate reading in litres per minute. Hand held, no tools required.
PART NO: 01-1C310

NSTS TESTING KITS

A robust case containing a master pressure gauge and a multi-port adapter as shown left. Also contains a nozzle pressure testing kit (PART NO: 363Q3168), which can be used to check the pressure at the nozzle and a measuring cylinder.
PART NO: 01TESTCASE-EF3
01TESTCASE-HARD (for Hardi sprayers)

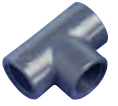
Pipes & Fittings

A comprehensive range of pipes and fittings can be supplied either individually or as sub-assemblies to an agreed specification. Specific o-rings are available for many threaded fittings, eliminating the need to use PTFE tape.

POLYPROPYLENE, NYLON AND PVC FITTINGS

Wide variety of fittings from $^{1}/_{2}$" to 2$^{1}/_{2}$".





QUICK RELEASE COUPLINGS

Wide variety of cam lever couplings from $^{1}/_{2}$" to 3", manufactured in glass reinforced polypropylene for strength and resistance. Stainless Steel also available.


NEW EXPRESS FITTINGS

Universal flange, hose barb, and cam lock boom-end connections, as well as venting nozzle body end caps. Eliminate threads and welds for simple fitting, leak free and perfectly aligned assembly. Manufactured in polypropylene.

PVC PIPE

Heavy duty, pressure rated up to 20 bar, $^{1}/_{2}$" to 2" nominal bore, can be supplied pre-drilled, for convenient on-site fabrication.

HOSE

Options of $^{3}/_{4}$" to 3" reinforced rubber hose for pressure applications and 1" to 3" inch Heliflex hose ideal for suction applications.

PRO-FIT FLANGE FITTINGS

Pro-FIT™

Provide secure and repeatable fitting without threads or welding.
Sealed with an EPDM gasket and secured by a jubilee clip.
Ideal for connecting Hypro Pump models with universal flange ports.
Manufactured from glass reinforced polypropylene for strength and durability. Available in 1", 2" and 3" in a wide range of configurations, just some of which are shown below.

	Part Number	Fitting Type
	UF200	2" Flange x 2" Flange
	UF300	3" Flange x 3" Flange
	UF100L	1" Elbow Flange x 1" Flange
	UF200L	2" Elbow Flange x 2" Flange
	UF300L	3" Elbow Flange x 3" Flange
	UF100L - HB150	1" Elbow Flange x 1½" Hose barb
	UF200L - HB200	2" Elbow Flange x 2" Hose barb
	UF300L - HB300	3" Elbow Flange x 3" Hose barb
	UF100 - HB150	1" Flange x 1½" Hose barb
	UF200 - HB200	2" Flange x 2" Hose barb
	UF300 - HB300	3" Flange x 3" Hose barb
	UF100 - MN100	1" Flange x 1" NPT male coupler
	UF200 - MN200	2" Flange x 2" NPT male coupler
	UF300 - MN300	3" Flange x 3" NPT male coupler
	UF200T	2" Tee flange
	UF300T	3" Tee flange
	UF100C	1" Jubilee clip
	UF200C	2" Jubilee clip
	UF300C	3" Jubilee clip
	UFG0100E	1" Universal flange gasket
	UFG0200E	2" Universal flange gasket
	UFG0300E	3" Universal flange gasket

Centrifugal Pumps

A centrifugal pump uses a rotating impeller to create a centrifugal force that feeds liquid through the system. Hypro's centrifugal pumps can deliver from 0-13 bar and flow rates up to 1650 l/min making them ideal for wide booms and faster speeds as well as continuous transfer applications.

Centrifugals are simple in design with no valves, they are durable, easy to maintain and suitable for pumping abrasive and corrosive materials. Plumbing is straightforward with no need for a relief valve, bypass or suction filter, however care should be given to the mounting location of the pump and complexity of plumbing. Choose from hydraulic motor, pedestal and PTO, drives, as well as models closed-coupled to petrol engines. Optional Life Guard® silicon carbide mechanical seals provide up to eight times life of a standard seal, in case of accidental run dry. Threaded and universal flange fitting options. Self-Priming options or use with Hypro's separate Self-Priming Adaptor (PART NO: 1530-0025S).

9303 SERIES CENTRIFUGAL PUMPS

Available in Cast Iron and Stainless with hydraulic motor drive. Flow up to 550 LPM and pressure up to 13 bar. Cast iron models have nylon turbine and Viton®/ceramic seal. Stainless Steel models have polypropylene turbine and Lifeguard® silicon carbide seals. 1-½ " NPT inlet - 1-¼" outlet. Self priming option available.

Model	Max flow (l/min)	Max pressure (bar)	Hyd. motor (l/min)
9303C-HM2C	360	6.5	13 to 25
9303C-HM4C	435	6.3	18 to 36
9303C-HM1C	431	13	40 to 52
9303C-HM5C	556	10	50 to 62
9303C-HM3C	473	6.8	55 to 75
9303S-HM2C	360	6.5	13 to 25
9303S-HM4C	435	6.3	18 to 36
9303S-HM1C	431	13	40 to 52
9303S-HM5C	556	10	50 to 62
9303S-HM3C	473	6.8	55 to 75
3430-0589	LifeGuard ® SiC Seal Kit		
3430-0332	Viton®/Ceramic Seal Kit		

For self-priming version add "-SP", for LifeGuard® (SiC) seal add suffix "-B", for 220 x 200 universal flange add suffix "-U".

9306 SERIES CENTRIFUGAL PUMPS

The 9306 series offers exceptional performance for a relatively small (301x237x230 mm) and lightweight (12 kg) pump. Flow up to 1200 l/min at pressures of 9.5 bar. Cast iron models have nylon turbine and Viton®/ceramic seal. Stainless Steel models have polypropylene turbine and Lifeguard® Silicon Carbide seals. Available with 2" NPT inlet and 1-½" NPT outlet or Universal Flange ports 3" x 2" or 2" x 1-½".

Model	Max. flow (l/min)	Max pressure (bar)	Hyd. motor (l/min)
9306C-HM1C	783	9	40 to 52
9306C-HM3C	810	9.3	55 to 75
9306C-HM5C	803	9.6	50 to 62
9303S-HM1C	783	9	40 to 52
9303S-HM3C	810	9.3	55 to 75
9303S-HM5C	803	9.6	50 to 62
3430-0332	Repair kit and o-ring seal		
3430-0589	Repair Kit LifeGuard ® seal		

For LifeGuard® (SiC) seal add suffix "B", for Universal Flange fittings (200x200) add suffix "-U", for Universal Flange (300x200) - Add suffix "- 3U" For full details of Centrifugal Pump range and options, see current Hypro catalogue.

9305C CENTRIFUGAL PUMPS

Flow up to 540 l/min at pressures up to 9.5 bar. Available in cast iron with Viton®/Ceramic seals (LifeGuard® SiC or Buna-N ceramic also available) and a nylon impeller. 2" NPT or BSP inlet and outlet. Self priming option available (-SP).

Model	Max. flow (l/min)	Max. pressure (bar)	Hyd. motor (l/min)
9305C-HM3C	689	10.7	64 - 72
9305C-HM3C-SP	674	10.6	64 - 72

For the LifeGuard® (SiC) seal add suffix "-B".

9047C CENTRIFUGAL PUMPS

For connection directly to a 540 rpm PTO drive. Capable of up to 800 l/min at pressure up to 11.5 bar. Cast iron with a glass filled nylon impeller. 2" inlet and 1½" BSP or NPT outlets. Fitted with LifeGuard® (SiC) seal for dry run protection as standard. Self priming option available (-SP).

Model	Max. flow (l/min)	Max. pressure (bar)	Max RPM
9047C	806	12.4	540
9047C-SP	738	11.7	540

Ideal for tank filling, high capacity liquid transfer irrigation and flood water removal. Offering flow rates up to 1650 l/min at up to 4 bar. Resistant polypropylene casing suitable for use with agrochemicals. Self-priming when pre-filled with water. Maximum suction height of 5 metres.

HYDRAULIC MOTOR DRIVEN TRANSFER PUMPS

Install anywhere on the sprayer. Impellers made from either nylon or polypropylene with Stainless Steel inserts, allowing you to work with fluids containing solid particles up to 0.95 cm in diameter. 2" model has flow up to 750 l/min and 3" model to 1650 l/min.

2" Model:

3" model:

Model	Max. flow (l/min)	Max. Pressure	Input / Output	Hyd. motor (l/min)
9342P-HM1C-5SP	757	4	2" x 2"	30 to 38
9342P-HM5C-5SP	780	4	2" x 2"	35 to 42
9343P-GM6Y-SP	1545	4	3" x 3"	30 to 40
9343P-GM10Y-SP	1650	3.5	3" x 3"	50 to 60
3430-0635	EPDM Seal Kit			

Y denotes case drain version.

PETROL ENGINE TRANSFER PUMPS

Close coupled to a 5.5HP petrol engine driving a 4100 watt electric motor, a lightweight and portable unit. 2" NPT inlet and outlet producing flows up to 568 l/min. Oil level sensor helps prevent seizing.

Model	Max. flow (l/min)	Max. Pressue (bar)	Input / Output	Hyd. motor (l/min)
N4151060	568	3.8	2"	5.5 HP

For full details of Centrifugal and Transfer Pump ranges and options, see current Hypro catalogue.

Roller Pumps

4 or 8 revolving rollers create smooth flows up to 230 l/min at up to 20 bar. Suitable for smaller sprayers or as an additional pump for higher pressure rinsing or chemical dilution. Roller pumps are self-priming and easily located on the sprayer and with few moving parts they are easily maintained. Hydraulic, PTO, petrol or electric drives are available. Casing, roller and seal materials can be specified according to the chemical compatibility required.

SERIES 1200

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
1200C	280	10	800	1½" NPT	1"

SERIES 1502

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
1502C	235	10	1000	1½" NPT	15/16"
1502N	235	10	1000	1½" NPT	15/16"
1502XL	235	10	1000	1½" NPT	15/16"

SERIES 1700

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
1700C	170	13.8	1000	1" NPT	15/16"
1700N	170	13.8	1000	1" NPT	15/16"
1700XL	170	13.8	1000	1" NPT	15/16"

SERIES 7560

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
7560C	85	20	1200	¾" NPT	15/16"
7560N	85	20	1200	¾" NPT	15/16"
7560XL	85	20	1200	¾" NPT	15/16"

SERIES 7700

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
7700C	85	13.8	800	¾" NPT	15/16"
7700N	85	13.8	800	¾" NPT	15/16"
7700XL	85	13.8	800	¾" NPT	15/16"

SERIES 6500

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Solid shaft
6500C	82	20	1200	¾" NPT	5/8"
6500N	82	20	1200	¾" NPT	5/8"

Teflon rollers - add suffix "T2", Polypropylene rollers - add suffix "T3".
Buna-N seals - add suffix "M", Viton© seals - add suffix "Q", Reverse Rotation: add suffix "R".
For full details of Roller Pump range and options, see current Hypro catalogue.

Heavy duty cast iron positive displacement pumps with a shaft and pistons. Suitable for high pressure (up to 68 bar) and relatively low flow rates up to 38 lpm, they are ideally suited to spraying non abrasive fluids from stationary sprayers, misting and cooling systems . Hypro's piston pumps are self priming and can be driven by 540 rpm PTO, petrol engine or an electric motor.

SERIES 5200 – BIG TWIN®

Model	Max. LPM	Max. BAR	Max. RPM	Connection	Shaft
5206C	30	27.5	800	¾" NPT	1"
5210C	38	27.5	600	¾" NPT	1"

Solid shaft is standard, for 1⅜" hollow shaft add suffix "-H".
Leather cups are standard. For fabric re-informced cups - add suffix "F" (e.g. 5210C-F), for Buna-N cups - add suffix "R" (e.g. 5206C-R).

SERIES 5300 – SMALL TWIN®

Model	Max. LPM	Max. BAR	Max.RPM	Connection	Shaft
5315C-X	5.6	34.5	1800	½" NPT	⅝"
5320C-X	8.3	34.5	1800	½" NPT	⅝"
5325C-X	9.5	34.5	1800	½" NPT	⅝"
5330C-X	11.3	34.5	1800	½" NPT	⅝"

Solid shaft is standard, for hollow shaft amend suffix "-HX" in place of "X".
Leather cups are standard. For Buna-N cups use suffix "-RX" (e.g. 5315C-RX), for Teflon cups use suffix "-CX" (e.g. 5315C-CX).

Knapsack and Hand Held Sprayers

Compression and knapsack sprayers and a comprehensive selection of spares and essential accessories.

VERMOREL 2000 COMFORT PRO SPRAYER

PART NO: 18102022

16 litre capacity. Requires approx. 10 manual strokes per minute to maintain spraying pressure. Adjustable padded straps and ergonomic frame. Includes nozzle pack and pressure relief valve for accurate spraying. Hypro's most popular knapsack sprayer for professional users. Electric version also available (part number: 19102040).

COSMOS 18 SPRAYER

PART NO: 18102216

18 litres capacity. High performance pump, 60 cm lance, easily changeable nozzle and liquid level indicator.

ELYTE COMPRESSION SPRAYERS

PART NOS: 18101005 (8 litre) and 1810003 (6 litre)

Ideal professional sprayer for smaller area spraying. Viton® seals allow use of more demanding spray materials such as disinfectants.

Accessories include; lances and lance extensions with up to 3.6 m reach, small spray booms, spray shields and a knapsack pressure regulator valve. For full details see **www.knapsacksprayers.co.uk**.

Hypro has a wide range of nozzles suitable for hand held sprayers.

POLLJET (AN) AND DEFLECTIP (DT) ANVIL TYPE 55-130°

Gives a broad band with a choice of swath widths. Coarse, even spray. Low drift, non-blocking (see page 21). 1 - 3 bar

FULL CONE 80°

Excellent foliar coverage for spot treatment of weeds. 1 - 5 bar

HOLLOW CONE 80°

Fine droplets for spraying insecticides and fungicides. 3 - 6 bar

EVENSPRAY 80°

Distributes a medium fine spray evenly across the swath. Ideal for all targets (see page 19). 2 - 4 bar

KITS

Contains Hollow Cone, Full Cone and Polijet nozzles and a 100 mesh filter.

PROBLEM	CAUSE	CORRECTIVE ACTION
a. Frequent nozzle blockage.	Screen too coarse.	Fit finer filter screen.
b. Pump will not suck.	Suction filter blocked.	Clean filter screen.
c. Pressure gauge fluctuates - nozzles "spitting".	Air in line/pump sucking air.	Check suction lines for air leaks.
d. Output falls across one boom section.	Pressure line filter blocked.	Clean filter screen.
e. Main gauge pressure falling.	Suction and/or flushing filters blocked.	Clean and/or flush filters.

Fitting a Hypro In-Line Pressure Monitor in each boom section can help prevent pressure related problems.

NB. It is possible to "Screen Off" certain chemicals if filtration is too fine.

Always check chemical label for specific advice on filtration.

Some recommended filters for different flow rates

APPROXIMATE FLOW RATE PER SPRAY NOZZLE	TYPICAL SPRAY NOZZLE EXAMPLES	NOZZLE FILTER	SMALL PRESSURE LINE FILTER ELEMENT	LARGE PRESSURE LINE FILTER OR FLUSHING FILTER ELEMENT	SUCTION FILTER ELEMENT
1.2 L/min or less	01, 02	100#/GREEN	80#/YELLOW	80#/YELLOW	50#/BLUE
1.2 to 3.2 L/min	04, 05, 06, 08	50#/BLUE	50#/BLUE	50#/BLUE	30#/RED
3.2 L/min or more	10, 15, 20	30#/RED	30#/RED	30#/RED	30#/RED

NB: Filter colour coding is based on ISO 19732:2007.

Troubleshooting: General Spraying

SYMPTOM	EFFECT	CAUSE (S)	SOLUTION
EXCESS CHEMICAL LEFT IN TANK AFTER SPRAYING 	Insufficient chemical applied resulting in poor agrochemical performance.	1: Inaccurate pressure gauge.	Test and recalibrate gauge and replace if necessary.
		2: Restrictions in pipes and/or hoses.	Check pressure at nozzle and note difference with main gauge.
			Fit larger or better routed pipe and/or hoses.
		3: Nozzles blocked or damaged.	Clean and calibrate nozzles (see p.6). Clean nozzle filters.
		4: Filters clogged.	Remove and clean system filters.
INSUFFICIENT CHEMICAL IN TANK TO COMPLETE SPRAYING 	Too much chemical applied therefore likelihood of crop damage.	1: Pressure gauge incorrect.	Have pressure gauge tested at AEA approved sprayer test station. Replace pressure gauge.
		2: Nozzles worn.	Recalibrate nozzles. Replace where worn and damaged.
	Chemical applied in unwanted drops when sprayer not in operation.	1: DCV diaphragm or pressure disc worn.	Replace DCV diaphragm and pressure disc.
POOR DISTRIBUTION ACROSS BOOM 	Strips of weed left after spraying or damage to crop.	1: Blocked nozzles.	Clean and calibrate nozzles (see p.6). Clean nozzle filters.
		2: Worn or damaged nozzles.	Calibrate and replace nozzles where required.
		3: Boom height incorrect.	Check boom height relative to spray angle of nozzles (see p.5) and nozzle spacing.
			Adjust boom height.
TOO MUCH SPRAY DRIFT 	Visible cloud behind sprayer during operation or damage to neighbouring crops.	1: Spraying pressure too high.	Reduce spraying pressure to recommended level.
		2: Pressure gauge inaccurate.	Replace gauge.
		3: Too windy for spraying.	Discontinue until wind drops to acceptable level (see p.7).
		4: Wrong nozzle choice.	Consider using drift reducing nozzles.
POOR CROP GROWTH 	Excessive weed, pest, disease infestation.	1: Wrong choice of nozzles.	Consult chemical label and Hypro for best nozzle choice.
		2: Worn or damaged nozzles.	Check and replace nozzles as appropriate.
		3: Incorrect boom height.	Check and adjust (see p.5).
		4: Poorly maintained sprayer.	Have machine checked by an AEA approved sprayer test station.
		5: Other reasons.	These could include the weather, adherence to dilution recommendations etc. If in doubt contact your agronomist or chemical distributor for advice.

Troubleshooting: Centrifugal pumps (Hydraulic motor)

In case of problems, first consider if the most appropriate pump has been selected and is correctly plumbed into the hydraulic system. If performance is not satisfactory, check the following guide for possible problems and solutions.

PROBLEM 1: LOW FLUID DISCHARGE	CORRECTIVE ACTION
a. Pump not primed	- Remove topmost vent plug from face of pump and run pump to expel trapped air.
b. Air leaks in inlet line.	- Check and reseal inlet fittings.
c. Blocked or clogged line filter.	- Inspect filter and clear any debris from screen.
d. Undersize inlet line or collapsed hose.	- Suction line should be the same diameter as inlet port of pump or larger.
e. Improperly sized hydraulic motor.	- Select proper size hydraulic motor for your hydraulic system.
f. Eye of impeller rubbing on volute.	- Remove volute (front cover) and inspect the impeller. If wear detected, sand the impeller eye O.D. with emery cloth.

PROBLEM 2: HYDRAULIC SYSTEM OVERHEATING	CORRECTIVE ACTION
a. Improper hydraulic motor size.	- Select proper size motor for your hydraulic system.
b. Insufficient hydraulic hose size.	- Check hydraulic hose size. Hose should be at least ½". For large open-center systems, ¾".
c. Bypass Adjustment Screw set to bypass too much oil	- Close adjustment screw on side of hydraulic motor to lessen the amount of oil being bypassed.
d. Improper metering orifice installed in pressure port.	- Refer to Installation manual for proper sizing.

Always refer to pump installation manual before working on a pump (manuals can be found at www.hypropumps.com).

Troubleshooting: Diaphragm Pumps

PROBLEM 1: PUMP DOES NOT SUCK	CORRECTIVE ACTION
a. Suction filter blocked.	- Clean filter.
b. Diaphragm pump - valves damaged or not seating.	- Check valves and clean seats.
c. Restriction in suction line.	- Rectify restriction.
d. Air entering pump inlet.	- Check for leaks in the hose and pipework on the suction side of the pump. Once resolved, with one or more boom sections open, run pump for 1 or 2 minutes at zero pressure, to evacuate all air.

PROBLEM 2: GAUGE NEEDLE FLUCTUATES & NOZZLES SPIT AIR	CORRECTIVE ACTION
Pump not evacuated of air or sucking air.	- Check for leaks in the hose and pipework on the suction side of the pump. Once resolved, with one or more boom sections open, run pump for 1 or 2 minutes at zero pressure, to evacuate all air.

PROBLEM 3: PUMP AND GAUGE NEEDLE PULSATE	CORRECTIVE ACTION
Incorrect pressure in air receiver.	- Pressurise air receiver to between 25 and 33% of operating pressure.

PROBLEM 4: LOSS OF PUMP PRESSURE	CORRECTIVE ACTION
a. Pressure regulator faulty or lacking capacity.	- Repair or replace.
b. Pump capacity insufficient for nozzles fitted.	- Change tips and / or spraying speed.
c. Diaphragm / Valves damaged.	- Check and replace.
d. Flow restricted.	- Check all filters and lines.

NOZZLE OUTPUT FOR OVERALL SPRAYING

$$\text{Litres/min per nozzle} = \frac{\text{L/Ha x km/hr x nozzle spacing (m)}}{600}$$

NOZZLE OUTPUT FOR BAND SPRAYING

$$\text{Litres/min per nozzle} = \frac{\text{L/Ha x km/hr x band width (m)}}{600}$$

CORRECTION FOR SPECIFIC GRAVITY OF SPRAYED LIQUID

Application rates shown in nozzle charts are based upon tests with plain water at 3 bar, 50cm nozzle spacing. Liquids with a higher Specific Gravity (S.G.) than water (e.g. liquid fertiliser) flow more slowly, so a *Correction Factor* needs to be calculated.

$$\textit{Correction Factor} = \sqrt{\frac{1}{\text{S.G.}}}$$

Use the Correction Factor to calculate a *Reference Application Rate:*

$$\text{Reference Application Rate l/ha} = \frac{\text{Target Application Rate in L/Ha}}{\text{Correction factor}}$$

Use this Reference Application Rate to select nozzzle size, pressure and speed from the nozzle charts on pages 13-24. These settings will then apply the **Target Application Rate**.

Example: When aiming to supply 240 l/ha of spray liquid with a specific gravity of 1:28 the correction factor calculates to 0.88.

$$\frac{240 \text{ l/Ha}}{0.88} = 273$$ *(use this figure to select the nozzle, and it will apply 240 l/ha)*

USEFUL CONVERSIONS

	MULTIPLY BY	TO OBTAIN
Centimetres (cm)	x 0.3937	inches
Metres (m)	x 3.281	feet
Kilometres (km)	x 0.6214	miles
Hectares (Ha)	x 2.471	acres
Millilitres (ml)	x 0.035	fluid ounces
Litres (l)	x 0.22	Imperial gallons
Litres (l)	x 0.264	US Gallons
Bar	x 14.5	psi

To convert litres/hectare to gallons/acre divide by 11.3 (imperial)

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Ideal for lower volumes
3* LERAP drift reduction

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